Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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COVID-19: Differences in sentinel injury and child abuse reporting during a pandemic

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ABSTRACT

Background and objectives: There is widespread concern that the COVID-19 pandemic has increased the incidence of child maltreatment. However, reports in the scientific literature documenting rates of child maltreatment during this period are scarce. This study was designed to explore whether the incidence of child maltreatment among patients presenting to a pediatric emergency department has increased during the COVID-19 pandemic.

Methods: We conducted a retrospective review of patients of all ages presenting to a pediatric Emergency Department trauma center, who also had a child abuse report filing or a sentinel injury diagnosis related to their index visit. All such patients who presented to this institution from March through July of 2017 through 2020 were included in the study.

Results: Analysis demonstrated an increase in the incidence of child maltreatment in May and June of 2020 and that there was an overall shift in distribution of types of child maltreatment during the COVID-19 pandemic. There was a significant increase in the proportion of emotional/psychological abuse (2.52 % before the pandemic to 7.00 % during the pandemic, $p \leq 0.0001$) and non-medical neglect (31.5%–40.0%, $p \leq 0.0001$).

Conclusions: We observed an increase in specific types of child maltreatment during the COVID-19 pandemic. These findings highlight the need for increased attention to children at risk for child abuse and neglect.

1. Introduction

Child maltreatment encompasses physical abuse, sexual abuse, emotional abuse, and/or neglect. Data collected by the U.S. Department of Health and Human Services indicates that, in 2018, approximately 1770 children in the United States died of abuse and neglect (Anonymous, 2018a). This figure represents an 11.3 % increase from 2014. In California, one in seven children is referred to

Abbreviations: ED, emergency department; CAR, child abuse report; CPS, Child Protective Services; NAT, nonaccidental trauma; CHOC, Children's Health of Orange County.

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Child Protective Services (CPS) before their fifth birthday; slightly more than one third of these cases are substantiated. The National Epidemiological Survey on Alcohol and Related Conditions, administered to 34,653 adults living in the United States, showed that 30.1 % had a history of child abuse (Afifi et al., 2011). These statistics indicate that the majority of child maltreatment cases go unrecognized.

The American Academy of Pediatrics identifies specific injuries that should raise suspicion for maltreatment: any injuries to non-ambulatory infants; injuries to multiple organ systems; multiple injuries in different stages of healing; patterned injuries; injuries to non-bony areas or locations over the torso, ears, face, neck, or upper arms; and significant unexplained injuries (Christian et al., 2015). Further investigation is warranted and should be tailored to the nature of a specific injury. Imaging (e.g., skeletal survey) and laboratory examinations (e.g., complete blood count) may be appropriate. There is growing evidence that these injuries, called sentinel injuries, should trigger an evaluation for maltreatment (Berger & Lindberg, 2019).

Screening for sentinel injuries, which are associated with child maltreatment, is one method used to identify potential cases of non-accidental trauma (NAT). In a retrospective study of 401 patients <12 months of age with relatively minor injuries, Sheets et al. showed that >25 % of abused patients, but zero non-abused patients, had previous sentinel injuries (Sheets et al., 2013). Later studies added more serious injuries to the definition of sentinel injury and continued to find an association with high rates of abuse (Lindberg, Beaty, Juarez-Colunga, Wood, & Runyan, 2015). Whether mild or severe in nature, sentinel injury screening is especially important in the emergency department (ED), which is a major referral center for child maltreatment and the initial point of contact for many abused children.

A child's risk for abuse and/or neglect increases during times of stress such as those of the current COVID-19 pandemic. The societal changes enacted to mitigate the spread of the virus have altered the lives of millions of families. In the area where the study was conducted, stay-at-home restrictions were mandated on March 19, 2020 to aid in controlling the spread of COVID-19 (Anonymous, 2020a). These stay-at-home orders restricted residents from leaving the home for non-essential travel, which was limited to grocery stores, hospitals, pharmacies, and individual workplaces. Many employers in the state had employees work from home during this period, and many schools and daycare facilities closed their physical premises to children. The majority of patients seen at the study institution during the pandemic were therefore assumed to have been living with a guardian subject to these stay-at-home policies.

In June 2020, experts at the World Health Organization expressed concerns regarding the increased risk of child maltreatment under stay-at-home guidelines (Anonymous, 2020b). Domestic violence has increased, and on April 30, 2020, the *Washington Post* reported an increase in the presentation of pediatric trauma to hospitals (Campbell, 2020; Schmidt & Natanson, 2020). These figures may underestimate the severity of the problem. Children who are forced to stay at home are less likely to come into contact with mandated reporters. Since March 19, 2020, the number of calls to child welfare agencies has decreased, suggesting that more cases of child maltreatment are going unreported (Campbell, 2020; Martinkevich et al., 2020; Thomas, Anurudran, Robb, & Burke, 2020). A review of data from five hospitals over a 1-month period spanning the lockdown of Italy showed that pediatric visits to the ED decreased by 73 % compared with the corresponding period 1 year earlier and by 88 % compared with the corresponding period 2 years earlier (Iozzi, Brambilla, Foiadelli, Marseglia, & Ciprandi, 2020). One study examined reports of child abuse and neglect made to the Los Angeles Police Department from July 24, 2019 to January 20, 2020, compared to reports made during the period from January 21, 2020 to July 19 2020, and found a significant decline during the COVID-19 pandemic (Barboza, Schiamberg, & Pachl, 2020). Nonetheless, there are relatively few reports in the scientific literature examining rates of child maltreatment during the pandemic. In this study, we investigated the rate of sentinel injury and or Child Abuse Report (CAR) filings to examine the effect of quarantine orders on child maltreatment during the COVID-19 pandemic.

2. Methods

For this retrospective study, we collected data from the electronic medical records of a single pediatric facility, an independent children's hospital and level 2 trauma center located in the city of Orange, California, USA. The institution has an annual ED volume of approximately 96,000 visits and adheres to standard-of-care guidelines for the identification, investigation, and follow-up of child maltreatment. Social workers are on site to perform evaluations 20 h per day, seven days per week. The hospital's Child Protection Team meets bi-monthly to review cases of suspected maltreatment. This study was reviewed and approved by the institutional review board (#190785).

2.1. Study population

The study included children 0–18 years of age who were admitted to the ED at our facility during the period from March 15 to July 31 of 2017, 2018, 2019, and 2020. The same months were chosen in each year to aid in eliminating potential seasonal variation.

2.2. Data collection

The numbers of sentinel injuries (in patients <6 months) and CAR filings (for all patients 0–18 years of age) during the COVID-19 pandemic were compared to historical data for the same population. Cases that occurred prior to March 2020 were classified as "Pre-COVID Restriction".

The CERNER database was queried for children <6 months with the following ICD-10 code diagnoses: ecchymosis, fracture, intracranial hemorrhage, abdominal trauma, open wound, oropharyngeal injury, superficial injury (e.g., cut, scrape, laceration, bruising, genital injury, burn) (see Supplemental information for details). All charts were reviewed to confirm sentinel injury. Sentinel

injuries were further classified by severity. Fracture, intracranial hemorrhage, abdominal trauma, and burns were classified as severe injuries. Ecchymosis, open wounds, oropharyngeal injury, superficial injuries, bruising, and genital injury were classified as non-severe injuries. In each case, a specialist in child abuse trauma categorized the abuse as confirmed, suspected, or neither confirmed nor suspected.

As part of the institution's standard of care, a child abuse report (CAR) is generated for each patient suspected of being subject to maltreatment. CARs were identified by searching the hospital's medical records and the Child Protection Team's database.

2.3. Statistical analysis

CARs for children 0–18 years of age were analyzed. For sentinel injury, analysis was limited to children <6 months of age. For datasets with <100 observations, Fisher's exact test was used to compare the distribution of categorical variables in data obtained before versus during the pandemic. For datasets with ≥100 observations, the Chi-square test was used to detect differences in the distribution of categorical variables. Cramer's V was used when Chi-square analysis was applied to produce a measure of the association between nominal variables. The Wilcoxon rank-sum was used to detect differences between time periods in the distribution of continuous variables. Analysis of variance (ANOVA) was conducted with the rate of sentinel injury as the response and year as the grouping variable. Rates of sentinel injury before versus during the COVID-19 pandemic were compared. The rate of sentinel injury was calculated as the number of children admitted to the ED with sentinel injury in a given month, divided by the total number of children admitted to the ED.

Logistic regression models were constructed to identify any association between CAR filings and injury type among victims of physical abuse, sexual abuse, or medical neglect/neglect. The covariates investigated were age, gender, race, ethnicity, insurance status, and presence of COVID restriction during the time period when abuse was reported. Month was used as a fixed categorical variable to control for seasonal variation in patterns of abuse. Regression models set the type of abuse as a binary response representing the abuse type of interest vs. any other type of abuse. The odds ratios and corresponding confidence intervals produced through this analysis represent the increase in odds of the specific type of abuse (physical, sexual, or neglect) occurring, compared to the combined odds for all other types of abuse investigated. Statistical analysis and visualization were conducted with R software (version 3.5.2) (Anonymous, 2018b).

3. Results

CARs were generated for a total of 776 children during the study period (Table 1). Overall, demographic variables did not differ significantly between datasets obtained before versus during the pandemic, except for race and insurance status. The largest difference in racial group distribution between time periods was the "Unknown or Declined to State" category (Table 2). Sentinel injuries were identified in 296 patients. Sentinel injuries were associated with slightly older age during the COVID-19 time period, compared with previous years (Table 3).

The distribution of patient abuse type was significantly associated ($p \leq 0.0001$) with time period in the sample of patients with CAR filings (Table 4). The frequency of emotional/ psychological abuse increased from 2.52 % before the pandemic to 7% during the pandemic. The frequency of non-medical neglect increased from 31.5%–40%, and the frequency of medical neglect increased from 3.06 % to 4.19 %. In contrast, the rate of physical abuse decreased from 30.8 % before the pandemic to 28.4 % during the pandemic. The rate of sexual abuse decreased from 21.0%–19.5%. The rate of maltreatment that could not be classified as physical abuse, sexual abuse, emotional/psychological abuse, medical neglect, or neglect decreased from 8.28 % before the pandemic to 0.47 % during the pandemic (Fig. 1) (Table 4).

Among the 296 patients with sentinel injuries, the rate of referral for a bone scan was lower before versus during the pandemic (16.2 % vs. 32.2 %, $p = 0.006$) (Table 5). The rate of confirmed abuse and injury severity were similar across injury types. ANOVA showed that differences in the rate of sentinel injury between time periods were not statistically significant (Table 6). Tukey's HSD test showed that the rate of sentinel injury did not differ significantly among time periods (2017, 2018, 2019, 2020).

Three separate regression models were constructed to identify covariates for the rates of neglect (medical neglect not included), physical abuse, and sexual abuse before versus during COVID-19. Within the CAR study group, neglect was significantly associated with age (OR 0.98, 95 %CI 0.98–0.99), with an estimated 1% decrease in odds of neglect for every year of increase in age (Table 7). The COVID-19 time period was significantly associated with neglect classification (OR 1.2, 95 %CI 1.11–1.31), representing an estimated 20 % increase in the odds of neglect, compared to other forms of abuse during this time period. Physical abuse was significantly less common among female, compared with male, patients (OR 0.9, 95 %CI 0.89–0.97, $p = 0.01$). Asian ethnicity was associated with increased odds of abuse classified as physical (OR 1.21, 95 %CI 1.05–1.41, $p = 0.001$). Sexual abuse reports were significantly

Table 1
Total child abuse reports generated by year.

Year	Number of reports (N = 776)
2017	158
2018	199
2019	204
2020	215

Table 2
Demographics of patients with child abuse reports.

	Characteristic	Pre-COVID	COVID	p-value
Age	Age (Mean, SD)	6.815, 5.69	7.31, 6.03	0.62
Gender				1
	Male	262 (46.8 %)	106 (49.3 %)	
	Female	297 (53.1 %)	109 (50.6 %)	
Race				0.0001
	White	347 (62.1 %)	99 (46.0 %)	
	African-American	30 (5.37 %)	13 (6.04 %)	
	Asian	43 (7.70 %)	12 (5.58 %)	
	American Indian	1 (0.17 %)	0 (0%)	
	Pacific Islander	2 (0.35 %)	1 (0.46 %)	
	Unknown	135 (24.1 %)	90 (41.8 %)	
Ethnicity				0.89
	Hispanic	293 (52.2 %)	109 (50.6 %)	
	Non-Hispanic	261 (46.5 %)	105 (48.8 %)	
	Decline	7 (1.24 %)	1 (0.46 %)	
Insurance				0.03
	Commercial Insurance	106 (18.8 %)	38 (17.6 %)	
	Medicaid Managed Care	406 (72.3 %)	153 (71.1 %)	
	Other	1 (0.17 %)	3 (1.39 %)	
	Other Government	2 (0.35 %)	4 (1.86 %)	
	Self-Pay	21 (3.74 %)	4 (1.86 %)	

Table 3
Demographics of patients with sentinel injuries.

	Characteristic	Pre-COVID (N = 234)	COVID (N = 62)	p-value
Age	Age (Mean, SD)	3.28 (1.84)	4.32 (2.14)	0.0005
Gender				0.39
	Male	12 4 (52.9 %)	37(59.6 %)	
	Female	110 (47.0 %)	25 (40.3 %)	
Race				0.33
	White	140 (59.82 %)	31(50 %)	
	African American	8 (3.418 %)	1 (1.612 %)	
	Asian	22 (9.401 %)	6 (9.677 %)	
	Pacific Islander	1 (0.427 %)	0 (0%)	
	Unknown	56 (23.93 %)	23 (37.09 %)	
Ethnicity				0.92
	Hispanic	119 (50.8 %)	31 (50 %)	
	Non-Hispanic	113 (48.2 %)	31 (50 %)	
	Decline	2 (0.85 %)	0 (0%)	
Insurance				0.96
	Commercial Insurance	76 (32.4 %)	19 (30.6 %)	
	Medicaid Managed care	152 (64.9 %)	42 (67.7 %)	
	Other Government	1 (0.42 %)	0 (0%)	
	Self-Pay	4 (1.70 %)	1 (1.61 %)	

associated with age (OR 1.01, 95 %CI 1.01–1.02), representing an estimated 1% decrease in odds for every year of increase in age. Risk for sexual abuse was 11 % greater among female, compared with male, patients (OR 1.11, 95 %CI 1.05–1.19). Compared with white ethnicity, Asian ethnicity was significantly associated with a 13 % decrease in risk for sexual abuse (OR 0.87, 95 %CI 0.76–0.98).

The rate of sentinel injury was higher in May and June 2020, compared with May and June 2017, 2018, and 2019 (Fig. 2). Of note, the overall ED census was lower in March through July of 2020, compared with the same months in preceding years (Table 8). Rates of sentinel injury were not significantly different during the COVID-19 pandemic, compared with the same months in preceding years ($p > 0.05$). However, when time period was limited to the month of June, a significant difference was found in the rate of sentinel injury before vs. during the COVID-19 pandemic ($p < 0.0001$ overall, $p = 0.01$). Among all time periods examined, June 2020 had the highest rate of CAR filings for patients 0–18 years of age ($n = 49$) and the second-highest rate of sentinel injury ($n = 23$).

4. Discussion

In this retrospective review of medical records at a single pediatric ED, maltreatment was more prevalent among younger children, risk for sexual abuse was higher among females than males, and the risk for physical abuse was higher among males than females. Similar trends have been reported in analyses of data collected at the national level (Anonymous, 2018a; Finkelhor, Turner, Shattuck, & Hamby, 2015). This study revealed a significant increase in the rate of child maltreatment (sentinel injury) in June 2020, and an

Table 4
Child abuse reports by maltreatment type.

All ED Patients				
Characteristic	Pre-COVID (n = 561)	COVID (n = 215)	Cramer's V	p-value
Age (mean, sd)	6.815, 5.69	7.31, 6.03		0.62
Gender			0.03	1
Male	262 (46.8 %)	106 (49.3 %)		
Female	297 (53.1 %)	109 (50.6 %)		
Race			0.18	0.0001
White	347 (62.1 %)	99 (46.0 %)		
African-American	30 (5.37 %)	13 (6.04 %)		
Asian	43 (7.70 %)	12 (5.58 %)		
American Indian	1 (0.17 %)	0 (0%)		
Pacific Islander	2 (0.35 %)	1 (0.46 %)		
Unknown	135 (24.1 %)	90 (41.8 %)		
Ethnicity			0.04	0.89
Hispanic	293 (52.2 %)	109 (50.6 %)		
non-Hispanic	261 (46.5 %)	105 (48.8 %)		
Decline	7 (1.24 %)	1 (0.46 %)		
Insurance			0.2	0.03
Commercial Insurance	106 (18.8 %)	38 (17.6 %)		
Medicaid Managed care	406 (72.3 %)	153 (71.1 %)		
Other	1 (0.17 %)	3 (1.39 %)		
Other Government	2 (0.35 %)	4 (1.86 %)		
Self Pay	21 (3.74 %)	4 (1.86 %)		
Injury Type			0.21	<0.0001
Domestic Violence	9 (1.62 %)	1 (0.46 %)		
Emotional/Psychological	14 (2.52 %)	15 (6.97 %)		
Medical Neglect	17 (3.06 %)	9 (4.18 %)		
Neglect	175 (31.5 %)	86 (40 %)		
Other	46 (8.28 %)	1 (0.46 %)		
Parental/Infant Positive Toxicology Screen	6 (1.08 %)	0 (0%)		
Physical	171(30.8 %)	61 (28.3 %)		
Sexual	117 (21.0 %)	42 (19.5 %)		

ED, emergency department.

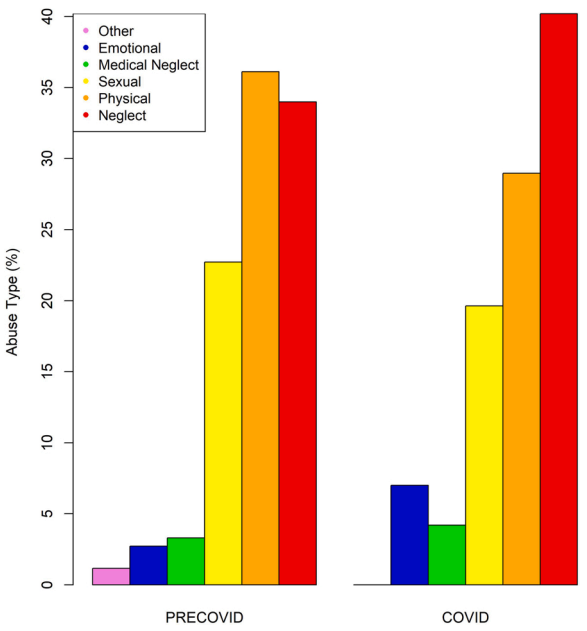

Fig. 1. Abuse type before vs. during COVID-19.

Table 5
Classification of sentinel injury.

		Pre-COVID	COVID	p-value
Injury Type				0.92
	Fracture	36 (15.3 %)	11 (17.7 %)	
	Intracranial Hemorrhage	2 (0.85 %)	1 (1.61 %)	
	Open Wound	139 (59.4 %)	40 (64.5 %)	
	Oropharyngeal Injury	1 (0.42 %)	0 (0%)	
	Superficial Injury	23 (9.82 %)	4 (6.45 %)	
	Bruising	28 (11.9 %)	6 (9.67 %)	
	Genital Injury	1 (0.42 %)	0 (0%)	
	Burn	3 (1.28 %)	0 (0%)	
Confirmed or Suspected Abuse				0.34
	Confirmed	13 (5.55 %)	6 (9.67 %)	
	Suspected	37 (15.8 %)	6 (9.67 %)	
	Not Confirmed or Suspected	184 (78.6 %)	50 (80.6 %)	
Injury Severity				0.71
	Not Severe	195 (83.3 %)	50 (80.6 %)	
	Severe	39 (16.6 %)	12 (19.3 %)	
Skeletal Survey Completed				0.006
	Yes	38 (16.2 %)	20 (32.2 %)	
	No	196 (83.7 %)	42 (67.7 %)	

Table 6
Rate of sentinel injury in patients < 6 months of age.

	2017	2018	2019	2020
March	8 (2.07 %)	6 (1.45 %)	6 (1.31 %)	7 (2.01 %)
April	16 (2.47 %)	27 (4.2 %)	8 (1.18 %)	2 (6.45 %)
May	14 (2.46 %)	10 (1.76 %)	20 (3.23 %)	18 (5.3 %)
June	18 (2.9 %)	18 (3.57 %)	17 (3.01 %)	23 (7.07 %)
July	24 (5.3 %)	20 (7.35 %)	22 (5.63 %)	12 (3.6 %)

Note: Analysis of variance in sentinel injury rate by year ($p = 0.88$).

Table 7
Logistic regression analysis of abuse classification.

	Neglect				Physical				Sexual			
	OR Estimate	95 % CI		p-value	OR Estimate	95 % CI		p-value	OR Estimate	95 % CI		p-value
Age (years)	0.98	0.98	0.99	<0.0001*	1.00	0.99	1.00	0.6410	1.01	1.01	1.02	<0.0001*
Female gender (male reference)	0.97	0.90	1.04	0.3957	0.90	0.84	0.97	0.0064*	1.11	1.05	1.19	0.0007*
African- American	1.06	0.89	1.27	0.5083	0.89	0.74	1.07	0.2178	0.93	0.80	1.09	0.3787
American Indian	0.81	0.34	1.95	0.6371	0.76	0.31	1.86	0.5438	0.77	0.36	1.65	0.5073
Asian	0.90	0.78	1.05	0.1733	1.21	1.05	1.41	0.0111*	0.87	0.76	0.98	0.0243*
Hawaiian / Pacific Islander	0.72	0.43	1.20	0.2071	1.05	0.63	1.77	0.8474	1.13	0.73	1.74	0.5902
Race unknown	0.98	0.90	1.06	0.5976	0.98	0.90	1.07	0.6211	1.03	0.96	1.11	0.4150
Non-Hispanic	0.96	0.89	1.05	0.3885	1.02	0.94	1.11	0.6360	0.97	0.90	1.04	0.3901
Ethnicity unknown	0.93	0.62	1.41	0.7462	0.95	0.62	1.45	0.8165	0.82	0.58	1.17	0.2803
Government	0.84	0.53	1.31	0.4380	1.55	0.98	2.45	0.0642	0.86	0.59	1.27	0.4517
Medicaid	0.97	0.89	1.06	0.5236	1.00	0.91	1.10	0.9458	0.96	0.89	1.03	0.2753
Other insurance	1.38	0.87	2.18	0.1717	1.00	0.62	1.59	0.9903	0.84	0.56	1.24	0.3745
Self-pay	1.24	0.92	1.66	0.1565	0.88	0.65	1.20	0.4237	0.98	0.76	1.26	0.8790
COVID Time Period	1.20	1.11	1.31	<0.0001*	0.94	0.87	1.03	0.1709	0.97	0.90	1.04	0.3936

CI, confidence interval; OR, odds ratio; *, statistically significant difference.

increase in CAR filings for neglect during the five-month period of the COVID-19 pandemic, compared to the same months in previous years. These findings add weight to existing concerns regarding increased rates of child maltreatment under mandatory stay-at-home orders. Notably, although most demographic characteristics of pediatric patients in the ED were similar before versus during the pandemic, race and insurance status differed between these time periods. Race and insurance status have both been shown to be associated with economic status. It is plausible that shifts in the distribution of those variables represent socioeconomic changes that are also related to COVID-19. Another notable finding was our observation that,

although we observed a decrease in the crude number of skeletal surveys performed during COVID compared with pre-COVID, the

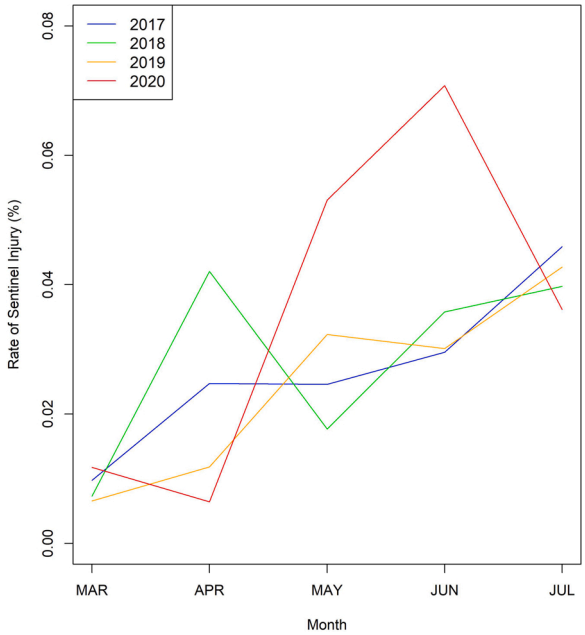

Fig. 2. Rate of sentinel injury in children <6 months of age before vs. during COVID-19 stay-at-home policy.

Table 8
Number of admissions to the emergency department at the study institution.

	2017	2018	2019	2020
April	8091	7019	9843	6399
May	8005	6915	8084	2736
June	7076	5977	7700	3400
July	6586	6529	6512	3827

proportion of skeletal surveys among pediatric visits to the ED at our institution significantly increased during the COVID-19 time period (Table 5). Furthermore, skeletal surveys may provide supporting evidence for specific types of physical abuse. While confirmed cases of abuse in patients <6 months of age increased from 5.5%–9.6%, this patient subset was small in size; therefore, the power to measure the statistical significance of this increase was limited. Nonetheless, it remains plausible that the increase in skeletal surveys is an indirect measure of increased physical abuse in those patients <6 months of age. This hypothesis is supported by the increased proportion of confirmed cases of abuse presented in Table 4.

Numerous factors may have contributed to the observed increase in the rate of child maltreatment during the COVID-19 pandemic. The pandemic and ensuing societal changes have exacerbated many of the stressors associated with child maltreatment. Levels of social isolation, poverty, unemployment, and family stress have risen, while access to structured school environments and extracurricular activities, which are associated with decreased risk, have decreased (Flaherty et al., 2010). In the United States, unemployment increased from 6.2 million in February 2020 to 20.5 million in May 2020. Pandemic-related closures of school and day-care services, in combination with the cessation of sports and other extra-curricular activities and the transition to working from home or unemployment, forced families into closer and more prolonged contact than ever before (Kochhar, 2020). Parents may be grappling with mental health challenges that had long been simmering under the surface, all while managing behavioral difficulties in children who are also terrified of the ways in which the world is changing (Patrick et al., 2020).

Our observation of an increase in psychological and emotional abuse during the pandemic is supported by recently published findings that parental job loss predicted psychological and physical abuse of children during the COVID-19 pandemic (Lawson, Piel, & Simon, 2020). Psychological maltreatment is often more difficult to detect than physical abuse: however, given its effect on child development, it is suspected to be associated with equally if not increased morbidity (Hibbard et al., 2012; Spinazzola et al., 2014).

In our study population, the proportion of physical abuse among all incidents of child maltreatment was lower during the COVID-19 pandemic than in previous years. This may reflect the reduction in contact between children and mandatory reporters or other adults outside the home. The move to virtual school platforms during the pandemic may allow abuse to remain hidden; educational personnel submit 20.5 % of reports of suspected abuse (Anonymous, 2018a). The increase in sentinel injuries seen at our institution in May and June 2020, as well as the reduced number of ED visits during this period, strongly suggest that the observed decrease in physical abuse is not real. Authors at other institutions have also reported reduced pediatric ED census during the COVID-19 pandemic, and one study from Montréal showed a specific decrease in injury-related pediatric ED visits (Chaiyachati, Agawu, Zorc, & Balamuth,

2020; Iozzi et al., 2020; Keays & Gagnon, 2020).

Despite the establishment in 2009 of the subspecialty of child maltreatment pediatrics, the commitment to evaluating children at risk for abuse remains inconsistent (Berger & Lindberg, 2019). In one study conducted over a 1.5-year period at four tertiary children's hospitals, abusive head trauma was missed in 25 % of cases (Letson et al., 2016). History of childhood maltreatment is associated with the victim's own perpetration of child maltreatment, as well as lower wages, underemployment, and low levels of education (Currie & Spatz Widom, 2010; van Ijzendoorn, Bakermans-Kranenburg, Coughlan, & Reijman, 2020). The total economic burden of child maltreatment in the US was determined in 2008 to be approximately $124 billion (Fang, Brown, Florence, & Mercy, 2012). These findings, in combination with the results presented above, highlight the need to strengthen our efforts in uncovering child maltreatment.

This study had some limitations. The fact that three-quarters of the study population used Medicaid Care Insurance suggests that our study may not be applicable to centers with another mix of patient populations. Furthermore, this characteristic of the study population may have led to an overestimation of the number of ED visits in this group. According to findings published by the Medicaid CHIP Payment and Access Commission, children with Medicaid visit the emergency room more often than children who are privately insured–their families are more likely to report that their usual medical providers were not open or that they did not have another place to obtain care (Anonymous, 2021). Another major limitation of the current study is the use of sentinel injuries and CAR filings as proxies for child maltreatment. Data on substantiated cases from CPS were not available for the time periods studied. Additionally, we were unable to distinguish whether the apparent increase in the proportion of neglect among all instances of child maltreatment reflected a decision to forego treatment for minor physical injuries during the pandemic or a true increase in the rate of neglect. Additional studies will be necessary to elucidate the observed trends. The sample size of this study was limited because of the reduction in overall ED census described above. Finally, a new protocol for the Timely Recognition of Abuse In Neonates (TRAIN) was implemented at our institution in October 2019. This may have fostered internal bias towards improved identification of sentinel injuries and abuse during the COVID-19 pandemic. Finally, June 2020 was a period of civil unrest in the United States. Although the sociological effects remain to be investigated, numerous factors may have affected home life as well as the likelihood that a patient would present for treatment at the ED. The impact of the social turmoil during the study period on the number of child abuse reports remains unclear.

5. Conclusion

The current study compared the rate of child maltreatment at a single pediatric ED from March 15 to July 31, 2020, during the COVID-19 pandemic, to rates seen in the same months of the preceding three years. Our findings suggest that the incidence of child neglect increased during the implementation of stay-at-home guidelines. Further research is necessary to investigate whether these findings may be extrapolated to other institutions and/or to the broader pediatric population. Knowledge of such a trend could help providers identify children at risk for maltreatment and, ultimately, provide an impetus to shape public policy and to improve the effectiveness with which resources are allocated to address this public health crisis.

Author's contribution

Dr. Theodore Heyming and Dr. Supriya Sharma conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. John Schomberg conducted the statistical analysis, drafted portions of the initial manuscript, and reviewed and revised the manuscript.

Dr. Daphne Wong, Dr. Carol Berkowitz, Chloe Knudsen-Robbins, and Dr. David Gibbs drafted portions of the initial manuscript and reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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What's new

Findings suggest that the rate of child neglect increased during the implementation of stay-at-home guidelines for children presenting to the Emergency Department.

Declaration of Competing Interest

The authors report no declarations of interest.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.chiabu.2021.104990.

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